

SODA ASH

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Soda ash, also known as sodium carbonate (Na_2CO_3), is an alkali chemical refined from the mineral trona or naturally occurring sodium-carbonate-bearing brines (both referred to as natural soda ash) or from the mineral nahcolite (referred to as natural sodium bicarbonate, from which soda ash can be produced), or manufactured from one of several chemical processes (referred to as synthetic soda ash).

Despite that most people have never heard of soda ash, it is an important industrial compound used to manufacture glass, chemicals, soaps and detergents, pulp and paper, and many other familiar consumer products. The United States is the world's largest soda-ash-producing nation with the world's largest natural deposit of trona. Because the majority of world output is made synthetically, which usually is more expensive to manufacture, U.S. natural soda ash is extremely competitive in world markets.

Production

Soda ash production and inventory data were collected by the U.S. Geological Survey (USGS) from monthly, quarterly, and annual voluntary surveys of the U.S. soda ash industry. A survey request was sent to each of the six soda ash companies, all of which responded, representing 100% of the total production data in this report (table 1). The information and data are fundamental resources for analysis, both within and outside the government. The soda ash data and information are used by the public and private sectors to better understand minerals and materials usage, the ultimate disposition of materials in the economy and in the environment, and to develop public and private sector policies and practices that better utilize our mineral and material resources. Some of the organizations that use the soda ash data and information are financial institutions, State and Federal agencies, soda-ash-consuming industries (e.g., glass, chemicals, detergents), educational institutions, and the general public.

U.S. production of natural soda ash from California, Colorado, and Wyoming in 2002 was 10.5 million metric tons (Mt), which was slightly higher than that of 2001. Based on about 14.5 Mt (16 million short tons) of total nameplate capacity, the U.S. soda ash industry operated at 72% of total capacity. This capacity utilization rate appears low because it includes the full nameplate capacity of 900,000 t (1 million short tons) for American Soda, L.L.P., which intentionally operated at only one-half capacity during the year, but was included in the industry total because nameplate capacity is based on the industry total as of December 31 of each year. In addition, the low capacity utilization rate resulted from idle capacity at OCI Chemical Corp. and FMC Wyoming Corp. of 816,000 t (900,000 short tons) and 1.18 Mt (1.3 million short tons), respectively. Approximately 2 Mt of nameplate capacity (2.2 million short tons), which represented about 14% of total industry nameplate capacity, was idled in 2002. This available capacity could be brought back online when market conditions improve.

The U.S. soda ash industry consisted of six companies in 2002—four in Wyoming operating four plants that produced soda ash from underground trona ore, one in California that produced soda ash from sodium carbonate-rich brines, and one in Colorado that produced soda ash and sodium bicarbonate from solution mining underground nahcolite. Nahcolite is a mineral that is naturally occurring sodium bicarbonate (its name is derived from the chemical elements contained in sodium bicarbonate—Na (sodium), H (hydrogen), C (carbon), O (oxygen), and “lite” (stone). The sixth plant, the former Tg Soda Ash Inc. plant in Wyoming owned by FMC Corp. was idle in 2002.

In January, The Williams Companies, Inc. announced it wanted to sell its 60% share of American Soda. Although the plant had initial startup problems in late 2000 and produced about one-half of targeted production in 2001, production increased in 2002 (Chemical Market Reporter, 2002d). American Alkali, Inc., which owns the remaining 40% of the operation, was interested in purchasing the plant but had not secured financing by yearend (Chemical Week, 2002e).

In August, Powerball International, Inc. and FMC Corporation signed a letter of intent to produce elemental sodium at FMC's soda ash plant in Green River, WY. Powerballs are small solid spheres of sodium hydride that are coated with a waterproof polyethylene plastic shell. Once the powerball is cut underwater, the sodium hydride reacts with the water to produce sodium hydroxide and hydrogen gas, which can provide the energy that can be used to power fuel cells and internal combustion engines. It also can be used for heating, food processing, and many industrial uses. Hydrogen has been proposed as an environmentally acceptable alternative to oil as a fuel. FMC will provide the source of sodium from its sodium-base trona ore and use part of its facility to construct a pilot plant (Powerball International, Inc., 2002¹).

Consumption

The USGS collects reported consumption data by end use on a quarterly basis from the marketing and sales departments of each

¹A reference that includes a section mark (§) is found in the Internet Reference Cited section.
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company. Every effort has been made to categorize company sales within the correct end-use sector. Quarterly reports are often revised in subsequent quarters because of customer reclassifications or other factors. All U.S. soda ash companies responded to the quarterly surveys; data represented 100% of the total reported consumption data found in this report.

In 2002, U.S. apparent consumption of soda ash was 6.25 Mt; reported consumption, however, was 6.43 Mt (table 1). Reported consumption and apparent consumption do not necessarily correspond because reported consumption is actual sales, whereas apparent consumption is the calculated quantity available for domestic consumption based on balancing supply (production, imports, and inventory adjustments) with external demand (exports).

In 2002, U.S. apparent consumption and reported consumption varied by 180,000 t, which was slightly more than 3% of apparent consumption. The discrepancy between the two forms of consumption was attributed to disagreement between the sources of export data used to derive consumption statistics. The two sources were the U.S. Census Bureau, which reports exports upon departure from the U.S. ports, and the soda ash producers, which consider a shipment as exported when their export association, the American Natural Soda Ash Corp. (ANSAC), takes consignment of the product at the California, Colorado, or Wyoming plantsites. Transit times between plant and port, which can take about 2 to 3 weeks before the cargo is actually exported, and carryover export inventories contribute to the discrepancy between reported and apparent consumption as well.

In the domestic market, large-volume buyers of soda ash were primarily the major glass container manufacturers whose purchases were seasonal (more beverage containers made in the second and third quarters for summertime beverage consumption). Soda ash sales to the flat glass sector were usually dependent on the state of the economy because the largest use of flat glass was in automobile manufacture and in residential housing and commercial building construction. These two major industrial sectors were especially sensitive to changing economic conditions, and soda ash sales follow trends in the two sectors. The distribution of soda ash by end use in 2002 was glass, 49%; chemicals, 26%; soap and detergents, 11%; distributors, 5%; miscellaneous uses, 4%; flue gas desulfurization and pulp and paper, 2% each; and water treatment, 1%.

Glass.—Glass manufacture represented about 49% of domestic soda ash consumption; the container sector accounted for 49%; flat, 35%; fiber, 9%, and specialty, 7%. Glass containers are made for beverages (beer, carbonated, and noncarbonated drinks), chemical and household products, food, liquor, medical products, and toiletries and cosmetics. Although the glass container sector has declined recently because of competition from plastic containers, production of glass containers for alternative malt beverages increased by about 3% in 2002 (Chemical Market Reporter, 2002c).

Chemicals.—Soda ash is used to manufacture many sodium-base inorganic chemicals, including sodium bicarbonate, sodium chromates, sodium phosphates, and sodium silicates.

Soaps and Detergents.—Detergents were the third largest use of soda ash. Soda ash was used as a builder to emulsify oil stains, to reduce the redeposition of dirt during washing and rinsing, to provide alkalinity for cleaning, and to soften laundry water. In addition, soda ash was a component of sodium tripolyphosphate (STPP), another major builder in detergent formulations. Soda ash consumption has been decreasing because phosphatic detergents can contribute to eutrophication, which is an environmental concern. Many regions of the Nation adopted phosphate limitations or bans, affecting about 40% of the U.S. population. A strong U.S. economy boosted demand for industrial and institutional cleaners and automatic dishwashing detergents in the past several years. New technology incorporating enzymes in dishwashing detergents and a move toward liquid cleansers, however, may adversely affect STPP consumption in the future.

In response to the environmental concern that cardboard detergent packaging contributes to the volume of landfill waste, detergent manufacturers changed formulations to make compact and superconcentrated products. These reformulations required sodium silicates and synthetic zeolites, which are made from soda ash. Liquid detergents, which do not contain any soda ash, competed with powdered detergents and commanded about 50% of the household laundry detergent market in 2002.

A new washing machine was introduced by Sanyo Electric Company of Japan that has a detergent-free wash cycle. Instead of using powder or liquid detergents to clean clothing, the new machine uses high-frequency sound waves and electrolytic charges to release stains and dirt from soiled clothing. This washing machine would benefit people who have sensitive skin that gets irritated from detergent residues that remain in clothes after washing. One drawback of this product reportedly is that the fibers of the clothes become frayed and frizzy from the sound waves (Chemical Week, 2002b).

Stocks

Yearend 2002 stocks of dense soda ash in domestic plant silos, warehouses, terminals, and on teamtracks amounted to 222,000 t. Producers indicated that a potential supply problem could exist if inventories fell below 180,000 t. Most consumers of soda ash did not have the storage facilities to accommodate large quantities of soda ash and had to rely on suppliers to provide the material on a timely basis.

Prices

The average annual value for bulk, dense natural soda ash, free-on-board (f.o.b.) Green River, WY, Searles Valley, CA, and Parachute, CO, was \$74.96 per metric ton (\$68.00 per short ton), which was a slight increase compared with that of 2001. The value is not a “price” but rather the value of the combined revenue of California, Colorado, and Wyoming bulk, dense soda ash sold on an f.o.b. plant basis at list, spot, or discount prices, on long-term contracts, and for export, divided by the quantity of soda ash sold. The list prices quoted in trade journals or by producers differed from the annual average values reported to and by the USGS. This value may or may not correspond to the posted list prices. The list price for Wyoming bulk, dense soda ash has not changed since it was

raised effective July 1, 1995, or as contracts permit, to \$105 per short ton from \$98 per short ton. The California price for the comparable product had also increased by \$7 per short ton to \$130 per short ton from \$123 per short ton (table 4).

In September, FMC Wyoming Corp. announced a \$7-per-short-ton increase on its off-list prices on all grades of bulk and bagged soda ash, not to exceed the current list price, effective immediately or as contracts permit. Other producers also followed with similar announcements (Chemical Market Reporter, 2002b).

Foreign Trade

U.S. soda ash export data for 2002 from the U.S. Census Bureau were adjusted using trade statistics from the Journal of Commerce's Port Import-Export Reporting Service and information provided by the industry. Approximately 19,000 t of erroneous or omitted export data (for Portugal through the Columbia-Snake River customs district, and for the United Kingdom through the Columbia-Snake customs district) were adjusted from the U.S. Census Bureau's total of 4.23 Mt. The adjusted total for exports in 2002 was 4.25 Mt, which represented about 40% of U.S. soda ash production in 2002.

U.S. soda ash exports are slowly increasing. In 2002, exports were 4% higher than those of 2001. U.S. exports to 38 countries, on a regional basis, were as follows: Asia, 39%; North America, 26%; South America, 21%; Europe, 7%; the Middle East, 3%; Oceania, 2%; and Africa and Central America, 1% each (table 5). Shipments to the Caribbean were negligible. The average free alongside ship value was \$117.65 per metric ton in 2002 compared with \$119.02 per ton in 2001 and \$122.52 per ton in 2000. Data in tables 1 and 6 are rounded to three significant digits; unit values listed are based on the unrounded statistics. The top 10 countries, representing 72% of total U.S. soda ash exports, in decreasing order and percentage of total were Mexico, 15%; Canada, 11%; Japan, 10%; China, 7%; Brazil, 7%; Indonesia, 5%; the Republic of Korea, 5%; Chile, 4%; Taiwan, 4%; and Venezuela, 4%. About 54% of all U.S. soda ash exports went through the Columbia-Snake River customs district; the Laredo, TX, customs district was the second largest, with 15% of the total (table 5). Exports to Canada increased because of the closure of Canada's only soda ash plant in Amherstburg, Ontario.

IMC Chemicals, Inc. announced in January that it planned to withdraw from ANSAC. The withdrawal will be effective January 1, 2004, because ANSAC has a 2-year exit clause. IMC reportedly lost some of its domestic sales in California and the Southwest and decided it would concentrate its efforts to expand export sales because it was the only producer close to west coast ports (Chemical Market Reporter, 2002a).

Imports of soda ash decreased by 73% to 9,000 t. The majority (95%) came from Canada, where General Chemical Corp. operated a synthetic soda ash plant in Amherstburg, Ontario, until April 2001. The facility produced dense soda ash as well as light soda ash, the majority of which was exported to the United States. The remainder of imports was from Bulgaria, China, Germany, Hong Kong, Israel, Japan, Mexico, Turkey, and the United Kingdom. The average customs-insurance-freight value of imported soda ash was \$121.83 per ton.

World Review

Soda ash is a mature commodity in which consumption tends to grow proportional to population and gross domestic product growth rates. For this reason, the largest customers of soda ash were, for the most part, developed nations, which have lower growth rates compared with developing countries that usually have greater demands for consumer products. Although the production and consumption quantities varied among the countries, the end-use patterns were basically the same; glass, chemicals, and detergents were the major sectors (table 8).

Nine countries had the capacity to produce more than 1 million metric tons per year (Mt/yr). They are, in descending order, the United States, China, Russia, India, Germany, France, Italy, Poland, and the United Kingdom. Bulgaria, Romania, and Ukraine had production installations that were rated at about 1 Mt/yr; adverse economic conditions, however, had caused these nations to produce below their design capacities. Recent acquisitions or joint ventures with major European soda ash producers that have soda ash manufacturing expertise should reverse this situation in the next few years. Most of these soda-ash-producing countries have large populations that require consumer products made with soda ash. The less developed nations tend to have higher soda ash demands and higher growth rates as soda-ash-consuming industries are developed. In 2002, world soda ash production was estimated to be 37.1 Mt, which was a 3% increase compared with that of 2001.

India.—The Indian Supreme Court granted an appeal by the ANSAC to remove an injunction banning U.S. soda ash exports to India. In 1996, the Supreme Court prepared an injunction at the request of the Indian Monopolies and Restrictive Trade Practices Commission in response to a petition from the Alkali Manufacturers Association of India (AMAI). Although the AMAI reportedly may challenge the latest decision, the Supreme Court stated that the Indian soda ash producers might have acted as a cartel to block competition with ANSAC (Chemical Week, 2002d; Industrial Minerals, 2002b).

Iran.—National Petrochemical Company of Iran announced plans in 2001 to construct a synthetic soda ash plant in Shiraz. In 2002, the company decided to cancel those plans and decided to expand capacity at its existing facility in Shiraz by 40,000 metric tons per year (t/yr). The facility's capacity is 80,000 t/yr of light soda ash, 66,000 t/yr of dense soda ash, and 20,000 t/yr of sodium bicarbonate (Chemical Week, 2002c).

Turkey.—Eti Soda, a public/private sector partnership, signed an agreement in April to proceed with the development of the Bey pazari underground trona mine near Ankara. About \$7.1 million has been spent since 1998 on developing entry tunnels, drainage systems, and infrastructure. The deposit, which has an estimated 250 Mt of reserves, was discovered in 1979 while exploring for coal. In 1983, the trona resources were held by the state-owned nonfuel mining group Etibank, which was later renamed Eti Holding. Eti Holding sought a private sector partner in 1998. Although several companies bid on the opportunity, Park Group was awarded a 76%

majority partnership with Eti Holding a 22% share, and the state-owned bank Vakifbank was awarded a 2% stake of Eti Soda. Eti Soda was attempting to locate credit financing for 70% of the total investment cost of \$300 million. The operation is scheduled to produce 500,000 t/yr when in full production in late 2005 or early 2006. A second trona deposit was discovered in 1998 at Kazan by Rio Tur Madencilik (a subsidiary of Rio Tinto Minerals Development Company). There is an estimated 600 Mt in reserves at this location. Although environmental and feasibility studies are being conducted, no date has been proposed for project completion (Industrial Minerals, 2002a).

United Kingdom.—Brunner Mond and Company, Ltd., Europe's second-largest soda ash producer, announced that it was interested in acquiring the synthetic soda ash plant of Rhodia in Nancy, France (capacity of 580,000 t/yr) and the synthetic soda ash plant of Lars Christensen Handel A/S at Strassfurt, Germany (capacity of 400,000 t/yr). The proposed acquisition would increase the company's total capacity by 60% to 2.7 Mt/yr in Europe (Chemical Week, 2002a).

Outlook

The U.S. soda ash industry will continue to have excess domestic capacity and experience strong competition from China in the export market to Asia. In 2003, China may surpass the United States as the world's largest soda ash producer. Soda ash consumption in China increased mainly because of a surge in construction activity in preparation of China hosting the 2008 Olympic games and various international expositions. Additional shutdowns of small, uneconomic soda ash plants and industry consolidation throughout the world may be required to reduce soda ash capacity and bring soda ash demand in line with higher capacity utilization rates. If this occurs, prices could stabilize, which would improve the operating economics of most producers.

Three dominant groups have survived to become the world leaders in soda ash—Solvay S.A. of Belgium, the ANSAC of the United States (which represents all six domestic producers), and China. In years to come, these three soda ash suppliers will produce and export soda ash to many customers all over the world. Because the glass container sector is the largest soda-ash-consuming sector, the demand for soda ash for glass containers may decline as consumers slowly accept their food and beverages packaged in the newer PET containers.

The outlook for soda ash for the next 5 years is favorable. Domestic soda ash is expected to grow between 0.5% and 1.0% per year, and world demand is forecast to range from 2.0% to 2.5% per year for the next several years. Asia and South America remain the likeliest areas for increased soda ash consumption in the near future.

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TABLE 1
SALIENT SODA ASH STATISTICS¹

(Thousand metric tons and thousand dollars except average annual value)

	1998	1999	2000	2001	2002
United States:					
Production ²	10,100	10,200	10,200	10,300	10,500
Value ²	\$842,000	\$779,000	\$748,000	\$773,000	\$784,000
Value, average annual:					
Per short ton	\$75.30	\$69.11	\$66.23	\$67.79	\$68.00
Per metric ton	\$83.00	\$76.00	\$73.00	\$74.73	\$74.96
Production, Wyoming trona	16,500	15,900	15,700	15,400	15,100
Exports	3,660	3,620	3,900	4,090	4,250
Value	\$478,000	\$447,000	\$477,000	\$487,000	\$500,000
Imports for consumption	83	92	75	33	9
Value	\$10,800	\$11,100	\$8,570	\$4,070	\$2,000
Stocks, December 31, producers'	273	248	245	226	222
Consumption:					
Apparent	6,560	6,740	6,430	6,310	6,250
Reported	6,550	6,430	6,390	6,380	6,430
World, production ^c	32,600 ^r	33,500 ^r	34,500 ^r	35,900 ^r	37,100

^cEstimated. ^rRevised.

¹Data are rounded to no more than three significant digits, except value per ton.

²Natural only; soda liquors and purge liquors are withheld to avoid disclosing company proprietary data.

TABLE 2
U.S. PRODUCERS OF SODA ASH IN 2002

(Million short tons, unless otherwise noted)

Company	Plant nameplate capacity	Plant location	Source of sodium carbonate
American Soda, L.L.P. ¹	1.00	Parachute, CO	Underground nahcolite.
FMC Wyoming Corp. - Green River ²	3.55	Green River, WY	Underground trona.
FMC Wyoming Corp. - Granger ³	1.30	Granger, WY	Do.
General Chemical (Soda Ash) Partners ⁴	2.80	Green River, WY	Do.
IMC Chemical Co. ⁵	1.45	Trona, CA	Dry lake brine.
OCI Chemical Corp. ⁶	3.10	Green River, WY	Underground trona.
Solvay Minerals Inc. ⁷	2.80	do.	Do.
Total	16.00		
Total million metric tons	14.50		

¹Came onstream October 2000. A joint venture with Williams Sodium Products Co., which is a wholly owned subsidiary of The Williams Companies, Inc. (60%) and American Alkali, Inc. (40%).

²Formed joint venture (20%) in February 1996 with Sumitomo Corp. and Nippon Sheet Glass Co., Ltd., both of Japan.

³Tg Soda Ash Inc. was sold to FMC Wyoming Corp. in July 1999.

⁴A joint venture between General Chemical Corp. (51%), Owens-Illinois, Inc. (acquired Australian Consolidated Industries International in 1998) (25%), and Tosoh Wyoming Inc. of Japan (24%), which purchased part of ACT's share in June 1992. An expansion was completed in 1998.

⁵IMC Global, Inc. acquired North American Chemical Co. in April 1998; operation renamed.

⁶Rhône-Poulenc Basic Chemicals Co. of France sold its 51% share to Oriental Chemical Industries Chemical Corp. (OCI) of the Republic of Korea on February 29, 1996; Anadarko Petroleum Corp., (acquired Union Pacific Resources Co. in 2000) owns 49%. An 800,000-short-ton expansion, brought onstream in November 1998, increased plant capacity to 3.1 million short tons; however, the company planned to take 900,000 short tons out of service temporarily for equipment refurbishment.

⁷Solvay Soda Ash Joint Venture is owned by Solvay S.A. of Belgium (80%) and Asahi Glass Co. of Japan (20%), which became a partner in February 1990. Capacity increase of 272,000 metric tons (300,000 short tons) installed December 1995 and 454,000 metric tons (500,000 short tons) in October 2000.

TABLE 3
REPORTED CONSUMPTION OF SODA ASH IN THE UNITED STATES, BY END USE, BY QUARTERS¹

(Metric tons)

SIC code	End use	2001	2002				Total
			First quarter	Second quarter	Third quarter	Fourth quarter	
32	Glass:						
3221	Container	1,510,000	356,000	424,000	402,000	379,000	1,560,000
3211	Flat	1,100,000	262,000	286,000	267,000	287,000	1,100,000
3296	Fiber	246,000	62,800	67,800	69,900	72,800	273,000
3229	Other	222,000	52,400	64,500	54,500	59,600	231,000
	Total	3,070,000	733,000	843,000	793,000	799,000	3,170,000
281	Chemicals	1,680,000	415,000	415,000	413,000	430,000	1,670,000
284	Soaps and detergents	697,000	181,000	205,000	179,000	168,000	733,000
26	Pulp and paper	148,000	30,900	26,200	24,900	22,500	104,000
2899	Water treatment ²	102,000	24,100	22,000	23,700	17,900	87,700
	Flue gas desulfurization	119,000	31,500	28,200	33,200	29,900	123,000
	Distributors	338,000	73,000	91,000	78,400	72,400	315,000
	Other	224,000	51,300	52,000	69,100	52,800	225,000
	Total domestic consumption ³	6,380,000	1,540,000	1,680,000	1,610,000	1,590,000	6,430,000
	Exports ⁴	3,680,000	846,000	899,000	975,000	1,040,000	3,760,000
	Canada	350,000	92,900	87,900	91,200	96,200	368,000
	Total industry sales ⁵	10,100,000	2,390,000	2,580,000	2,590,000	2,630,000	10,200,000
	Total sales from plants	10,500,000	2,560,000	2,620,000	2,720,000	2,750,000	10,600,000
	Total production	10,300,000	2,520,000	2,590,000	2,650,000	2,710,000	10,500,000

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Includes soda ash equivalent from soda liquors and purge liquors sold to powerplant for water treatment. Sales of mine water are excluded.

³Imports reported by the producer/importer have been distributed into appropriate end-use categories listed above.

⁴As reported by producers. Includes Canada. Data may not necessarily agree with that reported by the U.S. Census Bureau for the same periods.

⁵Represents soda ash from domestic origin (production and inventory changes) and imports and for exports. Includes soda ash sold by coproducers and distributed by purchasers into appropriate end-use categories.

TABLE 4
SODA ASH YEAREND PRICES

(Per short ton)

	2001	2002
Sodium carbonate (soda ash):		
Dense, 58% Na ₂ O 100-pound, paper bags, carlot, works, free on board	\$75.00-90.00	\$100.00-125.00
Bulk, carlot, same basis, tons	\$105.00	\$120.00-130.00
Light 58% 100-pound, paper bags, carlot same basis	\$210.00	\$180.00-220.00
Bulk, carlot, same basis, tons	\$173.00	\$173.00

Sources: Current prices of chemicals and related materials, Chemical Market Reporter, v. 261, no. 1, January 7, 2002, p. 26, and v. 263, no. 1, January 6, 2003, p. 23.

TABLE 5
REGIONAL DISTRIBUTION OF U.S. SODA ASH EXPORTS, BY CUSTOMS DISTRICTS, IN 2002¹

(Metric tons)

Customs districts	North America	Central America	South America	Caribbean	Europe	Middle East	Africa	Asia	Oceania	Total	Percentage of total
Atlantic:											
Baltimore, MD	--	--	--	--	17	--	--	--	--	17	(2)
Miami, FL	--	--	73	19	--	--	--	--	--	92	(2)
New York, NY	--	--	1	--	714	--	--	27	--	742	(2)
Gulf:											
Houston-Galveston, TX	--	20	--	--	34	--	--	--	--	54	(2)
Mobile, AL	9	--	--	--	--	--	--	--	--	9	(2)
New Orleans, LA	60	--	--	--	--	--	--	--	--	60	(2)
Port Arthur, TX	--	--	243,000	11,200	--	--	38,600	--	--	293,000	7
Pacific:											
Columbia-Snake River	--	33,000	206,000	--	262,000 ³	138,000	--	1,610,000	59,400	2,310,000	54
Los Angeles, CA	--	3,890	395,000	--	6,100	--	--	56,100	31,900	493,000	12
San Diego, CA	1,240	--	28,800	--	10,300	--	--	--	13,200	53,600	1
San Francisco, CA	--	--	--	--	97	--	--	--	--	97	(2)
Seattle, WA	28,300	--	--	--	--	--	--	--	--	28,300	1
North Central:											
Detroit, MI	363,000	--	--	--	257	--	--	--	--	363,000	9
Duluth, MN	212	--	--	--	--	--	--	--	--	212	(2)
Great Falls, MT	20,000	--	--	--	--	--	--	--	--	20,000	(2)
Pembina, ND	7,220	--	--	--	--	--	--	--	--	7,220	(2)
Northeast:											
Buffalo, NY	11,400	--	--	--	--	--	--	--	--	11,400	(2)
Ogdensburg, NY	858	--	--	--	--	--	--	--	--	858	(2)
St. Albans, VT	2,160	--	--	--	--	--	--	--	--	2,160	(2)
Southwest, Laredo, TX	635,000	--	--	--	--	--	--	--	--	635,000	15
Unknown	28,200	--	--	--	--	--	--	--	--	28,200	1
Total	1,100,000	36,900	872,000	11,200	279,000	138,000	38,600	1,670,000	104,000	4,250,000	100
Percentage of total	26	1	21	(2)	7	3	1	39	2	100	XX

XX Not applicable. -- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Less than 1/2 unit.

³Data discrepancies for Portugal (through Columbia-Snake customs district in November) and for the United Kingdom (through Columbia-Snake customs district in October) were adjusted. Approximately 19,000 metric tons of erroneous or omitted export data were adjusted from the U.S. Census Bureau's total of 4.23 million metric tons.

Source: U.S. Census Bureau, as adjusted by the U.S. Geological Survey using data and information from the Journal of Commerce PIERS trade service and industry sources.

TABLE 6
U.S. EXPORTS OF SODA ASH, BY COUNTRY¹

Country	2001			2002		
	Quantity (thousand metric tons)	Value ² (thousands)	Unit value	Quantity (thousand metric tons)	Value ² (thousands)	Unit value
Argentina	79	\$11,400	\$144	128	\$20,100	\$157
Australia	73	8,920	123	84	10,300	122
Belgium	114	13,400	118	126	17,200	136
Bolivia	3	420	168	--	--	--
Brazil	295	43,300	147	303	45,400	150
Canada	422	31,800	75	461	36,100	78
Chile	171	24,500	143	171	24,700	145
China	77	6,160	80	306	25,500	83
Colombia	65	11,500	176	84	15,400	184
Costa Rica	20	3,450	172	14	2,420	173
Ecuador	4	845	189	11	1,840	167
France	60	6,220	104	57	5,260	92
Guatemala	32	3,900	121	17	2,910	171
Indonesia	284	38,100	134	230	28,700	125
Italy	20	2,280	115	19	2,160	114
Japan	381	44,400	116	431	48,800	113
Korea, Republic of	264	32,100	122	206	23,600	114
Malaysia	142	20,200	143	107	15,300	143
Mexico	604	66,500	110	637	70,400	111
Netherlands	24	4,580	190	⁽³⁾	20	347
New Zealand	20	2,380	119	20	2,380	119
Nigeria	5	479	101	7	686	98
Pakistan	15	1,770	118	--	--	--
Panama	4	593	168	6	930	155
Peru	11	1,660	153	14	2,250	160
Philippines	81	9,410	117	62	7,670	124
Portugal	15	1,850	120	26	2,830	109
Russia	4	461	114	1	77	77
Saudi Arabia	143	12,300	86	106	8,950	84
South Africa	61	7,990	130	32	4,000	125
Spain	83	8,880	107	39	4,210	108
Taiwan	138	16,500	119	169	19,000	112
Thailand	191	22,600	118	145	18,300	126
Trinidad and Tobago	11	1,770	156	11	1,820	166
United Arab Emirates	45	3,720	83	32	2,660	83
United Kingdom	1	82	110	12	1,470	122
Venezuela	112	18,800	167	160	25,300	158
Vietnam	17	1,700	100	15	1,500	100
Other ⁴	⁽³⁾	49	172	⁽³⁾	26	361
Total	4,090	487,000	119	4,250	500,000	118

-- Zero.

¹Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

²Free alongside ship value.

³Less than 1/2 unit.

⁴Includes Aruba (2001), The Bahamas (2001), Egypt (2001), El Salvador (2001), Finland, Germany (2002), Jordan (2001), and Saint Kitts and Nevis (2001).

Source: U.S. Census Bureau, as adjusted by the U.S. Geological Survey using data and information from the Journal of Commerce PIERS trade service and industry sources.

TABLE 7
U.S. PRODUCTION OF SODIUM COMPOUNDS, BY MONTH¹

(Thousand metric tons)

	2001		2002	
	Soda ash	Wyoming trona ²	Soda ash	Wyoming trona ²
January	834	1,280	856	1,430
February	779	1,270	775	1,210
March	962	1,380	885	1,370
April	870	1,290	829	1,300
May	860	1,220	917	1,330
June	875	1,330	842	1,130
July	879	987	898	956
August	869	1,100	895	1,260
September	814	1,290	853	1,260
October	880	1,430	870	1,150
November	852	1,360	877	1,310
December	870	1,420	963	1,460
Total	10,300	15,400	10,500	15,100

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Includes solution-mined trona.

TABLE 8
SODA ASH: ESTIMATED WORLD PRODUCTION, BY COUNTRY^{1,2}

(Thousand metric tons)

Country	1998	1999	2000	2001	2002
Australia	300	300	300	300	300
Austria	150	150	150	150	150
Bosnia and Herzegovina	15	15	15	15	15
Botswana	190 ³	234 ³	191 ^{r,3}	251 ^{r,3}	270
Brazil	200	200	200	200	200
Bulgaria	800	800	800	800	800
Canada	300	300	300	300	300
China	7,440 ³	7,654 ³	8,343 ³	9,144 ^{r,3}	10,189 ³
Egypt	50	50	50	50	50
Ethiopia	12 ^r	5 ³	5 ³	5	6
France	1,000	1,000	1,000	1,000	1,000
Germany	1,400	1,400	1,400	1,400	1,400
India	1,500	1,500	1,500	1,500	1,500
Iran	125	146 ³	150	150	150
Italy	1,000	1,000	1,000	1,000	1,000
Japan	722 ³	722 ³	669 ³	680	690
Kenya ⁴	243 ³	246 ³	238 ³	298 ^{r,3}	308
Korea, Republic of	300	310	310	310	310
Mexico	290	290	290	290	290
Netherlands	400	400	400	400	400
Pakistan	220	230	230	203 ^r	230
Poland	1,000	926 ³	1,081 ³	1,100	1,100
Portugal	150	150	150	150	150
Romania	550	550	550	560	550
Russia	1,538 ³	1,918 ³	2,199 ³	2,370 ^r	2,400
Spain	500	500	500	500	500
Taiwan	126	140	140	140	140
Tanzania	-- ^r	-- ^r	-- ^r	-- ^r	--
Turkey	560 ^r	620 ^r	620 ^r	640 ^r	600
Ukraine	390	460 ³	500	650 ^r	678
United Kingdom	1,000	1,000	1,000	1,000	1,000
United States ⁴	10,100 ³	10,200 ³	10,200 ³	10,300 ³	10,500 ³
Total	32,600 ^r	33,500 ^r	34,500 ^r	35,900 ^r	37,100

^rRevised. -- Zero.

¹World totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

²Table includes data available through April 18, 2003. Synthetic unless otherwise specified.

³Reported figure.

⁴Natural only.